

IN THE CLAIMS

Please amend the claims to read as follows:

Listing of Claims

1-44. (Canceled).

45. (New) A valve unit comprising:

a chamber having an inlet and an outlet for fluid; and

a valve element accommodated in said chamber, wherein:

the shape of each of both ends of said valve element has a wedge-shaped, spherical, or conical form,

inclined portions which are brought into contact with said valve element are formed at said inlet and said outlet of said chamber, and

when said chamber is subjected to vibration, in a state in which said valve element is located at said outlet inclined portion due to fluid pressure within said chamber so as to close said outlet, said valve element moves with respect to said outlet inclined portion and said outlet is opened.

46. (New) A valve unit comprising:

a chamber having an inlet and an outlet for fluid; and

a valve element accommodated in said chamber, wherein:

an inclined portion is provided at said outlet,  
the shape of said valve element is spherical,  
an angle made by an inclined portion formed on an inlet side  
of said chamber is smaller than an angle made by said inclined  
portion formed on the outlet side of said chamber, and  
when said chamber is subjected to vibration, in a state in  
which said valve element is located at said outlet inclined  
portion due to fluid pressure within said chamber so as to close  
said outlet, said valve element moves with respect to said outlet  
inclined portion and said outlet is opened.

47. (New) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid; and  
a valve element accommodated in said chamber, wherein:  
an inclined portion is provided at said outlet,  
the shape of each end of said valve element has a  
wedge-shaped or conical form,  
an apex angle of an input-side end of said valve element is  
smaller than that of an output-side end thereof,  
an angle made by an inclined portion formed on an inlet side  
of said chamber is smaller than an angle made by said inclined  
portion formed on the outlet side of said chamber, and

when said chamber is subjected to vibration, in a state in which said valve element is located at said outlet inclined portion due to fluid pressure within said chamber so as to close said outlet, said valve element moves with respect to said outlet inclined portion and said outlet is opened.

48. (New) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber; and  
a valve-element urging component that urges said valve element toward said outlet of said chamber, wherein:  
an inclined portion is provided at said outlet, and  
when said chamber is subjected to vibration, in a state in which said valve element is located at said inclined portion due to fluid pressure within said chamber so as to close said outlet, said valve element moves with respect to said inclined portion and said outlet is opened.

49. (New) The valve unit of claim 48, wherein said valve-element urging component or said valve element is formed of a magnetic material and is attracted by a magnetic force of the other.

50. (New) The valve unit of claim 48, wherein said valve-element urging component is an urging spring or a resilient projecting piece.

51. (New) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid; and  
a valve element accommodated in said chamber, wherein:  
an inclined portion is provided at said outlet,  
when said chamber is subjected to vibration, in a state in which said valve element is located at said inclined portion due to fluid pressure within said chamber so as to close said outlet, said valve element moves with respect to said inclined portion and said outlet is opened, and

the movement of said valve element is promoted by vibrating said chamber with a frequency higher than that of a main vibration or by vibrating said chamber with an amplitude higher than that of the main vibration during a predetermined period before and after the opening of said outlet by said valve element.

52. (New) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid; and  
a valve element accommodated in said chamber, wherein:

an inclined portion is provided at said outlet,

when said chamber is subjected to vibration, in a state in which said valve element is located at said inclined portion due to fluid pressure within said chamber so as to close said outlet, said valve element moves with respect to said inclined portion and said outlet is opened, and

contact friction between said valve element and an inner wall of said chamber is reduced by imparting a vibration having a predetermined frequency and amplitude during a predetermined period before and after the opening of said outlet by said valve element.

53. (New) The valve unit of claim 52 wherein the vibration having the predetermined frequency and amplitude is imparted to said chamber.

54. (New) A valve unit comprising:

a chamber having an inlet and an outlet for fluid;

a valve element accommodated in said chamber; and

a valve-element urging component that urges said valve element toward said outlet of said chamber, wherein

the opening or closing state of said outlet or an opening level thereof is varied as a frequency or an amplitude of a

vibration applied to said chamber is varied and as a motional amplitude of said valve element is varied by the varied vibration.

55. (New) The valve unit of claim 54, wherein said valve-element urging component or said valve element is formed of a magnetic material and is attracted by a magnetic force of the other.

56. (New) A valve unit comprising:

- a chamber having an inlet and an outlet for fluid;
- a valve element accommodated in said chamber;
- an exciting component that vibrates said chamber so as to open and close said outlet of said chamber; and
- a driver that drives said exciting component, wherein:
  - said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber; and by varying a motional amplitude of said valve element by the varied vibration, and
  - the flow of fluid from said outlet is formed into a continuous flow or an intermittent flow by a variation of the vibration.

57. (New) A valve unit comprising:

a chamber having an inlet and an outlet for fluid;

a valve element accommodated in said chamber;

an exciting component that vibrates said chamber so as to open and close said outlet of said chamber; and

a driver that drives said exciting component, wherein:

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration, and

said exciting component superimposes a vibration having a frequency and an amplitude different from those of a main vibration on the main vibration.

58. (New) A valve unit comprising:

a chamber having an inlet and an outlet for fluid;

a valve element accommodated in said chamber;

an exciting component that vibrates said chamber so as to open and close said outlet of said chamber; and

a driver that drives said exciting component, wherein:

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency

or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration, and

said exciting component imparts such a vibration that a gas is released from said outlet and fluid is not discharged from inside said chamber when fluid is within said chamber.

59. (New) A valve unit comprising:

a chamber having an inlet and an outlet for fluid;

a valve element accommodated in said chamber;

an exciting component that vibrates said chamber so as to open and close said outlet of said chamber;

a driver that drives said exciting component; and

a gas venting portion is provided in a downstream-side channel of said chamber so that a liquid does not permeate said gas venting portion and only gas permeates said gas venting portion and is discharged, wherein

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration.



60. (New) A valve unit comprising:

- a chamber having an inlet and an outlet for fluid;
- a valve element accommodated in said chamber;
- an exciting component that vibrates said chamber so as to open and close said outlet of said chamber;
- a driver that drives said exciting component; and
- a head-coming-out detecting component that detects a head portion of the fluid when said chamber is filled with the fluid, wherein

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration.

61. (New) The valve unit of claim 60, wherein said head-coming-out detecting component is provided at a position downstream of said outlet of said chamber.

62. (New) The valve unit of claim 60, wherein said head-coming-out detecting component is a vibration detection component or an optical detection component.

63. (New) The valve unit of claim 60, wherein said head-coming-out detecting component is detachable.

64. (New) A valve unit comprising:

- a chamber having an inlet and an outlet for fluid;
- a valve element accommodated in said chamber;
- an exciting component that vibrates said chamber so as to open and close said outlet of said chamber;
- a driver that drives said exciting component; and
- a state detecting component that detects a change of state in said chamber when said chamber is filled with the fluid and detects physical properties or a flow velocity of the fluid from the detected change of state, wherein

said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying an amplitude of said valve element by the varied vibration.

65. (New) The valve unit of claim 64, wherein said state detecting component is a vibration detecting component or an optical detecting component.

66. (New) The valve unit of claim 64, wherein said state detecting component is detachable.

67. (New) The valve unit of claim 64, wherein:  
said driver has a control portion for controlling a driving waveform of said exciting component, and  
said control portion adjusts valve control data on the basis of the velocity or the physical properties of the fluid detected by said state detecting component.

68. (New) A valve unit comprising:  
a chamber having an inlet and an outlet for fluid;  
a valve element accommodated in said chamber;  
an exciting component that vibrates said chamber so as to open and close said outlet of said chamber; and  
a driver that drives said exciting component, wherein:  
said exciting component varies the opening or closing state of said outlet or an opening level thereof by varying a frequency or an amplitude of a vibration applied to said chamber and by varying a motional amplitude of said valve element by the varied vibration, and

said chamber is that of a microvalve with the breadth of  
said chamber being on the order of several micro meters to  
several hundred micro meters.